The claims are claims 1 to 3 and 9 to 11.

Claims 1 to 3 and 9 to 11 were rejected under 35 U.S.C. 103(a) as made obvious by the combination of Bloebaum et al. U.S. Patent 6,070,137 and Oppenheim Discrete Time Signal Processing.

Claims 1 and 9 recite subject matter not made obvious by Bloebaum et al. Claim 1 recites "calculating a smoothed power estimate by smoothing the power estimate over time." Claim 9 recites the noise suppression circuit operates to "calculate a smoothed power estimate by smoothing the power estimate over time." The OFFICE ACTION demonstrates that Bloebaum et al fails to make this limitation obvious. In particular, the OFFICE ACTION shows that Bloebaum et al teaches smoothing over time of a different signal than that claimed in claims 1 and 9.

Claim 1 recites calculation of "a gain function from the noise estimate and the smoothed power estimate." Claim 9 recites the noise suppression circuit operates to "calculate a gain function from the noise estimate and the smoothed power estimate." The OFFICE ACTION states at page 3, lines 12 and 13 that Bloebaum et al teaches:

> "calculates a gain function from the signal and noise power estimates (enhancement filter, col. 6, lines 8-10);"

This portion of the OFFICE ACTION refers to Figure 4 of Bloebaum et al. This Figure 4 illustrates transform and filter computation block 56 receiving the power spectral density (PSD) estimate represented by $|S(e^{j?})|^2$ from block 44 and the noise vector N from noise model adaptation block 46 and producing enhancement filter $|H(e^{j?})|$. In order for the Examiner's statement at page 3, lines 12 to 13 of the OFFICE ACTION to be true, one input to transform and

filter computation block 56 must correspond to the claimed noise estimate and the other input must correspond to the claimed smoothed power estimate. Bloebaum et al states at column 5, lines 58 and 59:

> "The forward transform G converts the noise vector N into the noise PSD estimate $|N(e^{j?})|^2$."

Thus this input to transform and filter computation block 56 must correspond to the claimed noise estimate. Accordingly, the other input to transform and filter computation block 56 $|S^{\wedge}(e^{j?})|^2$ must correspond to the claimed noise estimate must correspond to the claimed smoothed power estimate. However, Bloebaum et al fails to teach that this input is smoothed over time as required by the language of claims 1 and 9. Bloebaum et al states at column 5, lines 60 to 62 referring to variance reduction block 58:

> "The Variance Reduction block receives as input $|S(e^{j?})|^2$ and applies a smoothing function in the frequency domain to generate an output $|S^{\wedge}(e^{j?})|^2$."

Thus Bloebaum et al clearly teaches $|S^{\wedge}(e^{j?})|^2$ is smoothed in the frequency domain and not smoothed over time as recited in claims 1 and 9. The Applicant respectfully submits that disclosure of smoothing in the frequency domain fails to make obvious the smoothing over time of claims 1 and 9.

In summary, Bloebaum et al teaches a calculation of a gain or filter function in transform and filter computation block 56 similar to the recitations of claims 1 and 9. In Bloebaum et al, one input $|N(e^{j?})|^2$ is related to the noise estimate and the other input $|S(e^{j?})|^2$ is related to the power estimate. Claims 1 and 9 recite smoothing over time of the power estimate related input. Bloebaum et al teaches smoothing over time of noise estimate related term. This is the other input than that recited in claims

1 and 9. In addition, Bloebaum et al teaches smoothing in the frequency domain of the power estimate related input which is contrary to the language of claims 1 and 9. Accordingly, the combination of Bloebaum et al and Oppenheim fails to make obvious claims 1 and 9.

The OFFICE ACTTION states at page 3, lines 7 to 11 that Bloebaum et al teaches:

> "calculating a smoothed power estimate over time by smoothing the power estimate using the recited (i.e., first-order AR smoothing) equation (Fig. 5, element 64 with 'smoothed version of S' in col. 8, lines 6-8; *cf.* first order AR smoothing, col. 5, lines 38-44), wherein noting that S is signal power with signal present and noise power when signal absent, thus also calculating a noise estimate,"

The Applicants submit that the signal $\underline{N}$ supplied to transform and filter computation block 56 from noise model adaptation block 46 is only a noise estimate and includes no signal. Bloebaum et al states at column 5, lines 21 to 45:

> "An important aspect of integrating noise suppression into the MBE speech encoder 20 is the computation of a model of the background noise. The noise model in FIG. 3 is represented as a vector N output from a noise model adaptation block 46. This invention is not restricted to any particular method of modeling background noise, and several possible methods are discussed herein. The noise model is stored by the noise model adaptation block 46 and is updated when the vadFlag is set to zero, indicating that there is an absence of speech. The adaptation process involves smoothing of the model parameters in order to reduce the variance of the noise estimate. This may be done using either a moving average (MA), autoregressive (AR), or a combination ARMA process. AR smoothing is the preferred technique, since it provides good smoothing for a low ordered filter. This reduces the memory storage requirements for the noise suppression algorithm. The noise model adaptation with first order AR smoothing is given by the following equation:
>
> $N^{(i)} = aN^{(i-1)} + (1-a)S,$

> where a may be in the range 0.1=a=1, but is further
> constrained to the range 0.8=a=0.95 in the preferred
> embodiment of the invention. The vector S is an input to block
> 46 from a Transform and Filter Computation block 56."

The text of Bloebaum et al makes clear that the vector N is a noise
model "output from a noise model adaptation block 46." The first
order AR smoothing of the equation is used in adapting the noise
model. This portion of Bloebaum et al teaches that the noise model
"is updated when the vadFlag is set to zero, indicating that there
is an absence of speech." Accordingly, the AR smoothing equation
is employed only in the absence of signal in S and is employed only
to update a "noise model is stored by the noise model adaptation
block 46." This portion of Bloebaum et al clearly teaches
smoothing of the vector N from noise model adaptation block 46 as a
function of the prior noise vector N and the vector S in the
absence of signal. Thus this is not smoothing the power estimate
as claimed. Claims 1 and 9 recite such a noise estimate as a
different signal employed in the calculation of the gain function.
Thus this equation fails to make obvious calculating "a smoothed
power estimate by smoothing the power estimate over time" as
recited in claims 1 and 9.

The OFFICE ACTION cites variance reduction 64 described in
Bloebaum et al at column 8, lines 6 to 8 and illustrated in Figure
5 as teaching the recited smoothing over time with reference to
Bloebaum et al at column 5, lines 38 to 44. Bloebaum et al at
column 5, lines 38 to 44 teaches smoothing over time of the noise
vector N produced by noise model adaptation block 46. This
smoothing over time is not applicable to variance reduction 64 of
Figure 5. Bloebaum et al states at column 8, lines 1 to 10:

> "This alternate version is denoted by block 62 and is shown in
> FIG. 5. The principal novelty of the block 62 versus the block

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56 is that the enhancement filter is computed in the domain of
the noise model and then transformed to the sampled frequency
domain. In FIG. 5, the signal model vector S is input to the
Variance Reduction block 64, which outputs a smoothed version
of S denoted S^. This vector S and the noise model vector N
are input to the Enhancement Filter Computation block 66."

This teaching of Bloebaum et al fails to state that variance
reduction block 64 smoothes over time as required by the language
of claims 1 and 9. Because Figure 5 is taught as an alternative to
Figure 4, one skilled in the art would believe that variance
reduction block 64 operates similarly to analogous variance
reduction block 58 of Figure 4. As quoted above, Bloebaum et al
states at column 5, lines 60 to 62 variance reduction block 58
smoothes in the frequency domain. Accordingly, one skilled in the
art would believe that variance reduction block 64 also smoothes in
the frequency domain. Thus claims 1 and 9 are not made obvious by
the combination of Bloebaum et al and Oppenheim.

The OFFICE ACTION at page 4, lines 1 to 12 suggests that the
disclosure in Oppenheim that convolution in the frequency domain
corresponds to multiplication in the time domain means that the
smoothing in frequency domain taught in Bloebaum et al makes
obvious the smoothing in the time domain recited in claims 1 and 9.
The OFFICE ACTION states that Bloebaum et al teaches at column 6,
lines 1 to 6 that the smoothing in the frequency domain can be
performed by linear or circular convolution in the frequency
domain. Employing the teaching of Oppenheim to this teaching of
Bloebaum et al means that the convolution in the frequency domain
taught in Bloebaum et al is the equivalent to multiplication in the
time domain. Note that claims 1 and 9 recite smoothing in the time
domain and do not recite multiplication in the time domain. Thus
this equivalence taught in Oppenheim fails to make obvious the
smoothing in the time domain recited in claims 1 and 9. Oppenheim
teaches that one function in the frequency domain (convolution) is

equivalent to a different function (multiplication) in the time domain. The Examiner attempts to use Oppenheim to teach that one function in the frequency domain (time smoothing) of Bloebaum et al is equivalent to the same function (time smoothing) in the time domain. This is not the teaching of Oppenheim and is incorrect. Note further that Oppenheim does not teach smoothing in the time domain and likewise fails to teach what would be the equivalent function in the frequency domain disclosed in Bloebaum et al. Thus the equivalence taught in Oppenheim when applied to the disclosure of Bloebaum et al fails to make obvious the time smoothing of the power estimate recited in claims 1 and 9. Accordingly, claims 1 and 9 are allowable over the combination of Bloebaum et al and Oppenheim.

Claims 2, 3, 10 and 11 are allowable by dependency upon allowable base claims.

The Applicants respectfully request entry and consideration of this amendment. Entry of this amendment is proper at this time because no new search or reconsideration is required.

The Applicants respectfully submit that all the present claims are allowable for the reasons set forth above. Therefore early entry of this amendment, reconsideration and advance to issue are respectfully requested.

If the Examiner has any questions or other correspondence regarding this application, Applicants request that the Examiner contact Applicants' attorney at the below listed telephone number and address to facilitate prosecution.

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